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Rural Water Supplies in South Dakota : Washington County

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WASHINGTON County

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RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

WASHINGTON COUNTY

BY

WALTER V. SEARIGHT

AND

ELMER E. MELEEN

PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Maleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections, each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map. This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent, in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

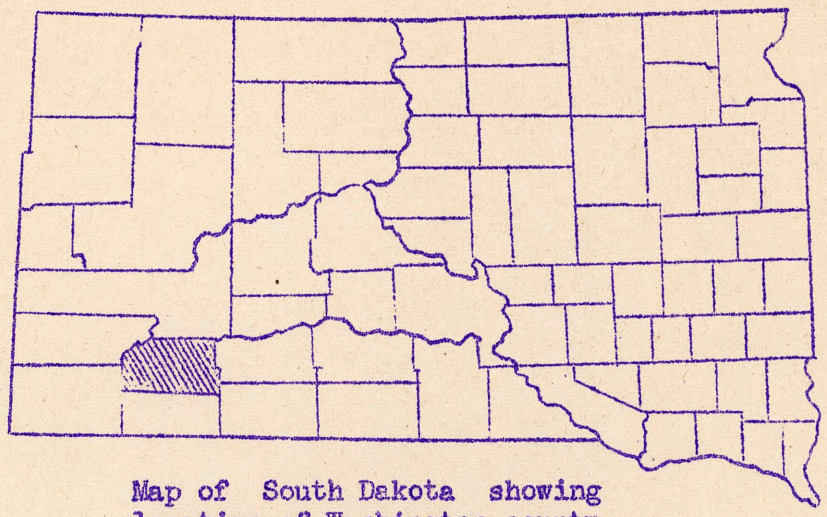
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

W A S H I N G T O N C O U N T Y

Washington county lies in the southwestern part of South Dakota, approximately 20 miles north of the Nebraska state line and 50 miles east of the Wyoming boundary. It is bounded on the north by Pennington county, on the east by Washabaugh county, on the south by Shannon county, and on the west by Fall River and Custer counties.



Map of South Dakota showing location of Washington county

Washington county is mainly an agricultural county with about one third, 238,545, (32.2 per cent) of the total of 740,480 acres in farms, divided into 364 farm units of approximately 655 acres each. A total of 26,222 acres are under cultivation. Hay, wheat, corn, oats, rye, and barley are the important field crops, being produced in the order named. Livestock is also important; cattle, horses and sheep being of the greatest value.*

In order that farms of this type may be operated successfully, suitable and adequate supplies of underground water at low cost are necessary. The supplies required are not great.but they should be generally distributed and constant. The well location map of Washington county indicates that, in general, such supplies are available and widely distributed.

On the well location map of Washington county, all wells are shown in red and are called shallow wells regardless of depth. On all other maps, and in

*South Dakota Agricultural Statistics, Annual Report, 1937

the tables and text of this report, the term shallow wells applies to those wells of 200 feet in depth or less, and those greater than 200 feet deep are treated as deep wells, unless otherwise stated.

Questionnaires were sent to 147 farmers and land owners of Washington county, of whom 77 responded with information on 68 wells and 14 springs throughout the county. This represented a 52.3 per cent coverage.

DEPTH AND DISTRIBUTION

Rural water supplies of Washington county are obtained from deep pumped and shallow pumped wells widely distributed throughout the county. There were no artesian wells reported in the county.

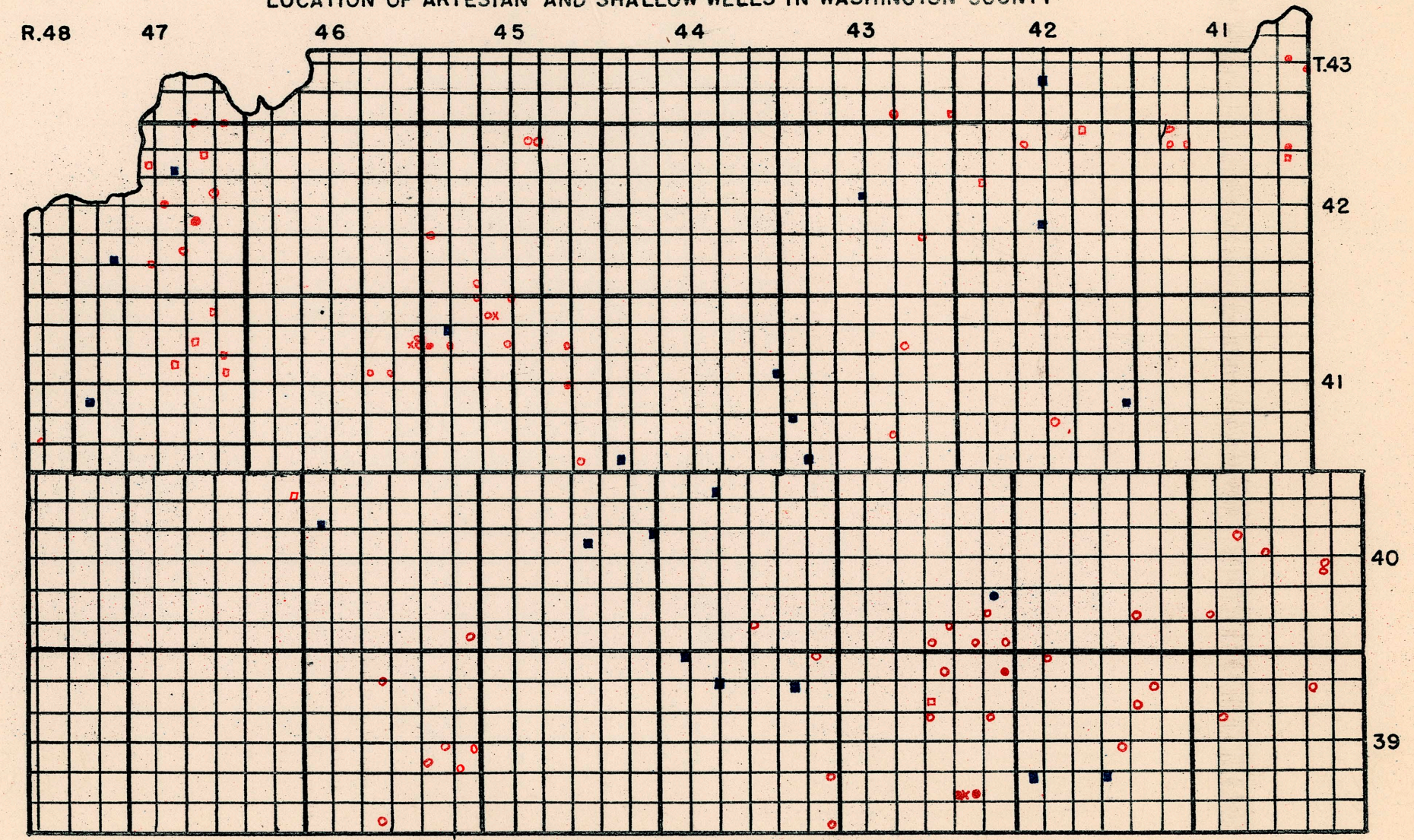
Shallow wells: Approximately 92 per cent (92.6) of all wells reported in the county were shallow pumped wells. Of the 63 shallow wells reported, 44.5 per cent were from 0 to 50 feet in depth; 27 per cent 50 to 100 feet; 19 per cent between 100 to 150 feet; and 9.5 per cent from 150 to 200 feet. Thus, approximately 71 per cent of all shallow wells reported were less than 100 feet in depth. Wells less than 100 feet in depth also comprised approximately two thirds of the total wells reported in the county. The shallower wells are used whenever possible because of the increased cost of construction of deeper wells, and lack of supplies at intermediate depths. The shallow well map shows the approximate depths at which shallow supplies were obtained in Washington county.

All of the shallow wells from the following eleven townships were reported as being less than 100 feet in depth:

Twp.	Rge.	Twp.	Rge.	Twp.	Rge.	Twp.	Rge.
40N.	44	41N.	45W.	42N.	42W.	43N.	41W.
41	43	41	48	42	43	43	43
		42	41	42	45		
				42	47		

In general, in the remaining townships, shallow wells occured at various depths between 0 and 200 feet, with the exception of five townships reporting all shallow wells with a depth range between 100 and 200 feet. The following

LOCATION OF ARTESIAN AND SHALLOW WELLS IN WASHINGTON COUNTY



townships reported all wells to be shallow:

Twp.	Rge.	Number of Wells	Twp.	Rge.	Number of Wells
39N.	41W.	2	41N.	46W.	4
39	44	3	41	48	1
39	46	4	42	41	4
40	42	1	42	42	1
40	43	5	42	43	1
40	44	1	42	45	4
41	42	1	42	47	6
41	45	9	43	41	2
			43	43	1

Deep wells: Approximately 7 per cent of the rural water supplies of Washington county were obtained from deep pumped wells. Five deep wells were reported in five of the 39 townships in the county and these ranged in depth from 230 to 312 feet (see table 2). These deeper wells were widely distributed, and users did not supply sufficient information upon which to predict the probable depth at which adequate and suitable supplies are available. The following tabulation shows the location, percentage, and number of deep wells reported:

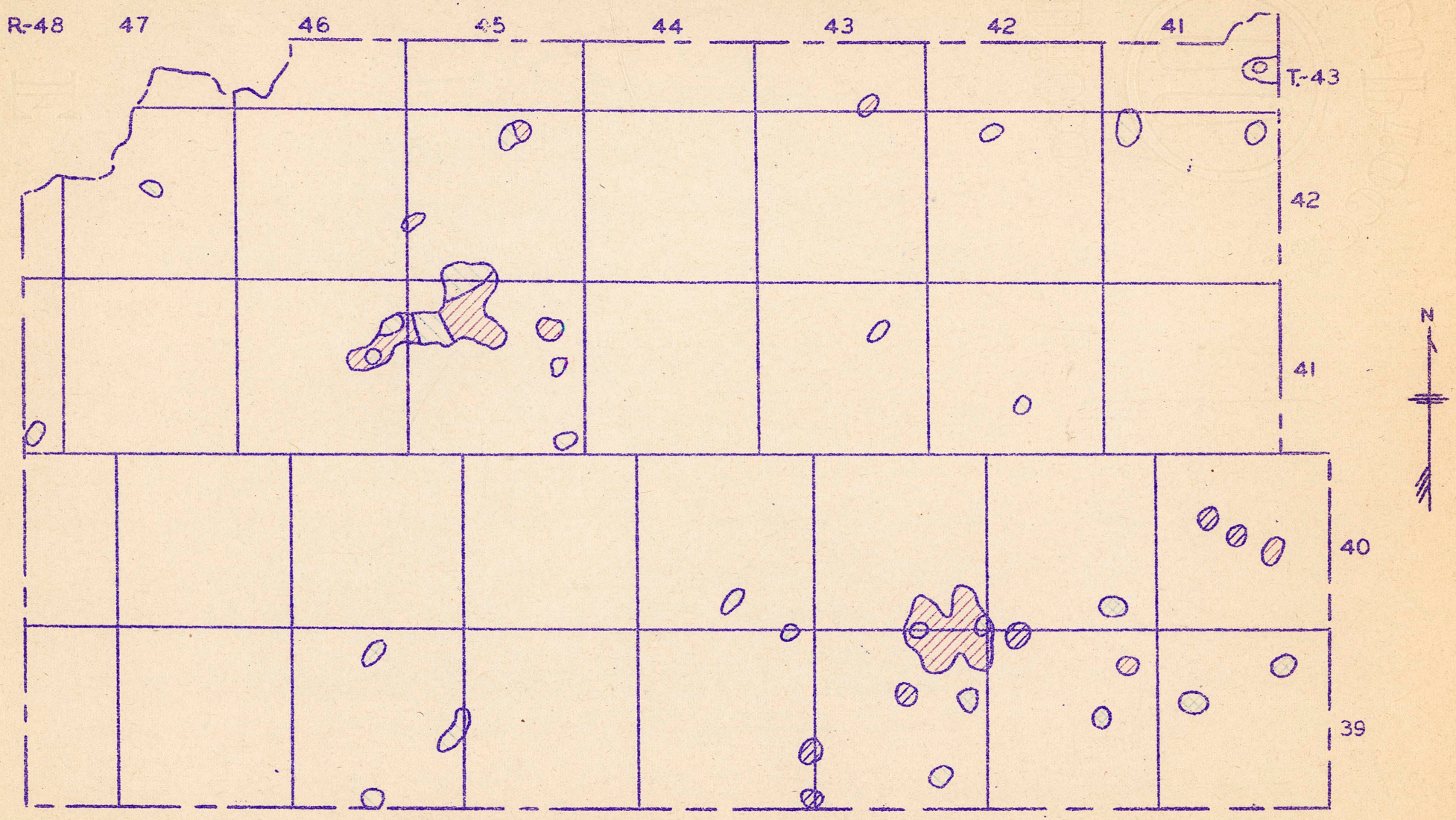
Twp.	Rge.	Number of Wells	Per cent Deep	Twp.	Rge.	Number of Wells	Per cent Deep
39N.	43W.	1	16.7	39N.	42W.	1	25.
40	41	1	20.	41	43	1	50.
40	46	1	100				

CHARACTER OF WELL WATERS

In order to determine the character of well waters in the county, users were asked to indicate whether they considered supplies to be hard, moderately hard, or soft. Although chemical analyses are not commonly available to farmers, usage of water is a fairly satisfactory criterion of quality until adequate laboratory analyses are available.

In general, wells in Washington county produce hard or moderately hard water, although a very high percentage of soft water wells were reported. Of the shallow wells reported, 12 per cent produced hard water, 40 per cent moderately hard, and 48 per cent soft. Thus, approximately 52 per cent of the shallow wells in the county produced definitely or moderately hard water. Hard

WASHINGTON COUNTY



SHALLOW WELLS (0-200 FT.)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

0-50 FT. 50-100 FT. 100-150 FT. 150-200 FT.

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MILES
0 2 4 6

water wells were rather widely distributed over the county with the exception of the following townships, which reported soft water: T.42N., R.41W., T.42N., R.42W., T.42N., R.45W., T.42N., R.47W., and T.43N., R.41W. Approximately 60 per cent of the wells less than 100 feet deep were reported to supply soft water.

Character of the water of only two deep wells was reported. Moderately hard water was reported from one deep well in T.39N., R.42W., and soft water was reported from one well in T.39N., R.43W.

Wells in Washington county produced water suitable for drinking purposes, since of the 68 wells reported from the county, none were reported unsuitable for drinking.

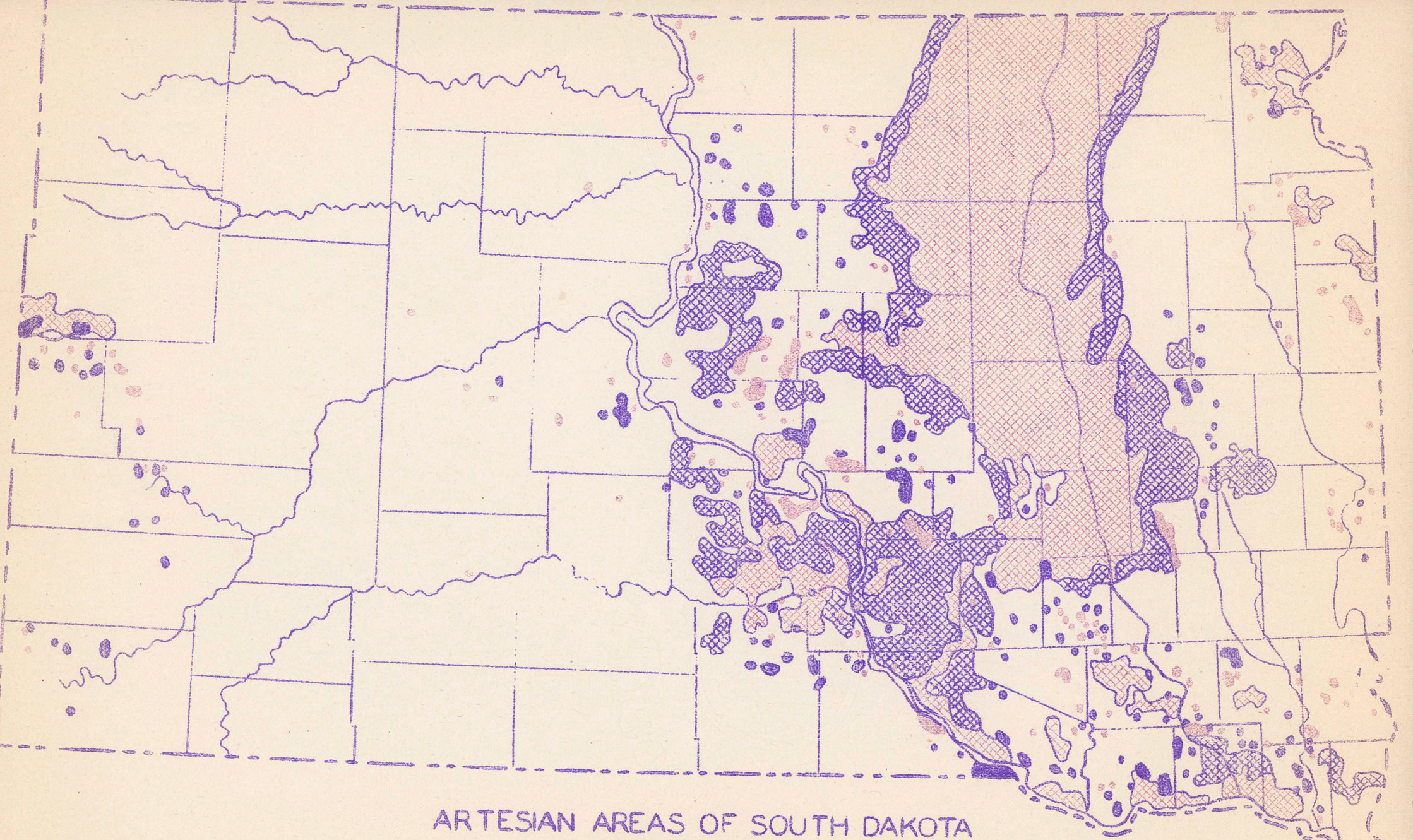
ADEQUACY OF WELL WATERS

Supplies were mostly reported adequate for present needs in Washington county. Needs vary, however, and changes in land usage, modification of farm management, or dry cycles in this and surrounding land areas affect both supply and demand for water.

In general, of the 68 wells reported, 10 (14.7 per cent) were inadequate for present needs. Nine of the inadequate wells were shallow, and one deep inadequate well was reported from T.39N., R.43W., with a depth of 250 feet. No inadequate wells among the shallow wells more than 100 feet in depth, were reported. Four wells varying in depth from 50 to 100 feet were reported, and from wells 0 to 50 feet deep, five inadequate wells were reported.

IRRIGATION

Eight shallow wells were used to irrigate 4 1/8 acres in garden plots ranging in size from 1/8 to 2 acres. One deep well was used to irrigate a 1/2 acre plot in T.39N., R.43W. Three springs were used to irrigate garden plots from 1/8 to 1/2 acre in size.



ARTESIAN AREAS OF SOUTH DAKOTA

1938

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W.P. 3636

FLOWING WELLS

PUMPED ARTESIAN WELLS

SUPPLEMENTARY SUPPLIES

Springs were a fairly important source of supplementary supplies in Washington county since fourteen were reported. These were used for domestic purposes where well supplies were inadequate or unsuitable and were also used for watering stock. None of the fourteen springs was inadequate for present needs. Only four springs reported on the character of supplies but these all produced soft water. None of the springs were reported unsuitable for drinking.

Following is a tabulation of the location and number of springs reported from Washington county:

Twp.	Rge.	Number of Springs
39N.	43W.	1
40	47	1
41	47	5
42	41	1

Twp.	Rge.	Number of Springs
42N.	42W.	2
42	47	3
43	43	1

No cisterns were reported from Washington county.

WASHINGTON COUNTY
Table 1.
DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
39	41	2	128	146	137	1	1	-	-	-	2	-	-	-
39	42	3	100	160	136	-	3	-	-	-	3	-	-	-
39	43	5	33	167	113	-	2	3	-	-	3	2	1	5/8
39	44	3	130	190	163	3	-	-	-	-	3	-	-	-
39	46	4	25	121	78	1	1	2	1	-	4	-	-	-
40	41	4	40	180	93	-	2	1	-	-	4	-	1	1/8
40	42	1	-	-	110	-	-	-	-	-	1	-	-	-
40	43	5	40	109	72	-	4	-	-	-	5	-	1	1/2
40	44	1	-	-	68	-	1	-	-	-	1	-	1	2
40	46	None												
41	42	1	-	-	116	-	-	-	-	-	1	-	-	-
41	43	1	-	-	18	-	1	-	1	-	1	-	-	-
41	45	9	16	80	51	1	1	6	-	-	7	2	2	5/8
41	46	4	45	120	71	-	3	-	-	-	4	-	-	-
41	48	1	-	-	24	-	-	-	-	-	1	-	-	-
42	41	4	10	50	25	-	-	3	-	-	3	1	-	-
42	42	1	-	-	35	-	-	1	-	-	1	-	-	-
42	43	1	-	-	6	-	-	-	-	-	1	-	-	-
42	45	4	35	85	58	-	-	4	-	-	4	-	1	1/8
42	47	6	6	30	18	-	-	2	-	-	4	2	-	-
43	41	2	30	60	45	-	-	2	-	-	-	2	-	-
43	43	1	-	-	85	-	1	-	-	-	1	-	1	1/8
Total		63				6	20	24	2		54	9	8	4 1/8

WASHINGTON COUNTY
Table 2.
DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
39	42	1	-	-	230	-	1	-	-	-	1	-	-	-
39	43	1	-	-	250	-	-	1	1	-	-	1	1	1/2
40	41	1	-	-	312	-	-	-	-	-	1	-	-	-
40	46	1	-	-	290	-	-	-	-	-	1	-	-	-
41	43	1	-	-	240	-	-	-	-	-	1	-	-	-
Total		5				-	1	1	1	-	4	1	1	1/2

NOTE: No Flowing Wells reported in Washington County.

WASHINGTON COUNTY - WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.39N., R.43W. Sec. 11	"No well. Difficulty in construction account of sand."
T.39N., R.43W. N½SW¼ Sec. 26	33 feet: "The well never was satisfactory. Had to quit account of quicksand as they came to a formation. They could not go through. Water was good tasting and sufficient for domestic needs but went dry altogether this spring."
T.41N., R.46W. SE 1/4 Sec. 12	45 feet: "Very fine water. Supply seems unlimited."
T.43N., R.41W. SW 1/4 Sec. 24	60 feet: "Difficulty in construction account of sand."

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